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An Early Contribution to Chelonian Anatomy by Johannes Müller (1801–1858): The Drawings for the Zootomical Dissertation of Carl August Mohring (1799–1838) on the Osteology of *Trionyx aegyptiacus* from 1824

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Abstract: Johannes Müller (1801–1858) undertook a study visit in Berlin with Karl Asmund Rudolphi (1771–1832) right after defending his dissertation during the early 1820s. During that time he worked on various subjects but did not publish any of it himself. However, he contributed the drawings for the plates that accompanied the dissertation of Carl August Mohring (1799–1838) in 1824. Mohring had received the task to describe the osteology of *Trionyx triunguis* (Forskål, 1775), which was referred to as "*Trionyx aegyptiacus*", and a specimen of which had been recently acquired for the anatomical-zootomical museum by Rudolphi. Friedrich Wilhelm Hemprich (1796–1825) and Christian Gottfried Ehrenberg (1795–1876) were at that time collecting in Egypt and Arabia and in friendly contact with Rudolphi, making them a likely source of origin for the specimen, which today has to be considered lost. Müller provided drawings of the skull in various views, and also of the entire articulated skeleton. These illustrations were at that time the most detailed representations of the anatomy of a trionychid turtle published. For Müller, these were his first contributions to comparative anatomy that actually surfaced in print.

Keywords: Christian Gottfried Ehrenberg, Friedrich Wilhelm Hemprich, Carl August Mohring, Johannes Müller, Nile softshell turtle, Karl Asmund Rudolphi, Trionychidae, *Trionyx triunguis*

Johannes Müller (1801–1858) and Herpetology

The introduction of Johannes Müller (Fig. 1) can be kept brief since numerous contemporaries praised his life and work in the immediate aftermath of his death (Bischoff 1858, Virchow 1858, du Bois-Reymond 1860), as did several subsequent scholars (e.g. Haberling 1924, Ebbecke 1951, Koller 1958). Carus (1872) even mentioned him, along with Charles Darwin (1809–1882), in the title of his history of zoology for his outstanding contributions to the field.

Given his enormous breadth of impactful works it should come as no surprise that these extend into the field of herpetology as well. Adler (2012) devoted a brief entry to him, and Lambertz (2018) also provided a slightly longer (yet still not comprehensive) appreciation of his contributions to herpetology.

Born in Koblenz (today Rhineland-Palatinate, Germany) on 14 July 1801, Müller studied medicine in Bonn (today Northrhine-Westfalia, Germany) between 1819 and 1822, visited Berlin (Germany) for one and a half years afterwards (during which the events leading to the present article took place), then returned to Bonn where he completed his habilitation

Fig. 1. Undated portrait lithograph of Johannes Müller. Coll. M.L.

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(1824), became an adjunct (1826) and eventually full professor (1830), before moving to Berlin for good in 1833 as full professor for anatomy and physiology and director of the anatomical museum. He died in Berlin on 28 April 1858.

A number of his general anatomical and physiological works were conducted using amphibians and reptiles as study objects, and he was engaged in a small number of herp-related taxonomic works as well (see Adler 2012, Lambertz 2018). His most important contributions to herpetology, however, can be found in two papers deriving from his final years while still in Bonn. Müller (1831) provided the first unambiguous anatomical evidence that caecilians are amphibians and not snakes: he discovered gill openings in a juvenile *Ichthyophis hypocyaneus* (van Hasselt in Boie, 1827[1]). A year later, Müller (1832) erected the name Gymnophiona, still in use for this group of animals. In that same paper, while generally still treating the entirety of amphibians and reptiles as "Amphibien", as it was common practice during that time, he noted a fundamental difference in the developmental process of these two groups of animals. The reptiles differ from the amphibians among other things by the presence of an amnion, the extraembryonic structure allowing them to reproduce independent of environmental water. Haeckel (1866) later coined the currently still used name Amniota for the entirety of fully terrestrial craniotes (see also Lambertz 2016), which, of course, also include the reptiles.

A herpetological contribution by Müller that has, until now, gone unnoticed can be found in a dissertation that was written while Müller visited Berlin for the first time (Mohring 1824). At that time, Müller himself had only published four works: an article written while still a student, dealing with the locomotion of animals (Müller 1822a) that eventually was extended into his own dissertation (Müller 1822b), his famous results of a prize task[2] on fetal respiration also already conducted while still a student (Müller 1823), as well as an anonymously published critical book review (Müller 1824).

Carl August Mohring (1799–1838)

Almost the only biographical information about Mohring is that provided by himself in the CV appended to his dissertation (Mohring 1824). He states that he was born on 19 May 1799 in Nordhausen (Thuringia, Germany) as the son of August Carl Mohring, at that time senator of the free imperial city, and later administrator of the public treasury, and that his mother came from the Münter family.

As a child he received a private education and entered the gymnasium in Nordhausen in 1809, where he stayed until the Easter term of 1817. From April 1817 until 16 September 1818 he attended the *Königliche Pädagogium* in Illfeld (Thuringia) (Wiedasch 1853).

After that he performed military service for a year in the 2nd battalion of the 31st infantry regiment under the command of Ernst von Kesteloot (1778–1847) and eventually enrolled in Medicine at the University of Göttingen (Lower Saxony, Germany) on 11 October 1819 (von Selle 1937).

Among the various courses he took there were natural history, comparative anatomy and physiology with Johann Friedrich Blumenbach (1752–1840), botany with Heinrich Adolf Schrader (1767–1836), as well as two courses in anatomical dissections, one with Konrad Johann Martin Langenbeck (1776–1851) and the other with Adolph Friedrich Hempel (1767–1834). These were complemented by a number of general as well as special medical courses.

In his CV, Mohring states that he arrived in Berlin the first day of Easter 1822 and that he enrolled at the university on 17 April 1822. Wernicke (1822) however, gives the date as 22 April 1822. Since Mohring provides the day in Roman numerals, it is possible that the "V" of the XVII was a missprint of an initial "X". Wernicke (1822) furthermore records him living at Jägersraße 14.

In Berlin Mohring particularly expanded his clinical training, but also attended botany lectures with Heinrich Friedrich Link (1767–1851). His dissertation was executed under the supervision of Karl Asmund Rudolphi (1771–1832) and defended on 06 March 1824 (see also below).

Mohring's remaining life remains shrouded in mystery. There is an online Nordhausen-Wiki, which, based on the former local periodical *Nordhäusisches wöchentliches Nachrichts-Blatt* (accessed 03 September 2025), lists the deaths between 1798 and 1849, but provides the age instead of the date of birth. Therein we find a "Senator" Johann August Carl

[1] There is some controversy in the literature regarding the correct authorship of the name for this species. Most recently, Savage et al. (2025) attributed it to Heinrich Boie (1794–1827) in Friedrich Boie's (1789–1870) paper from 1827. The reasoning behind this was the fact that most of the new names in Boie (1827) derive from H. Boie's unpublished *Erpétologie de Java*. However, this particular name appears to have not derived from H. Boie. Instead of a direct reference to to the *Erpétologie de Java*, Boie (1827: col. 565) clearly refers to van Hasselt, and only added a "Cf. Erp. de Java". Species names attributed by F. Boie directly to his brother's unpublished book are marked without a "Cf.". But a similar combination, for instance, is found when F. Boie lists "*Tropidonotus vittatus*" (col. 535): "*Linn*. Cf. Erpét. de Java"; this species indeed usually today is treated as *Xenochrophis vittatus* (Linnaeus, 1758). When discussing the Javan caecilian, Taylor (1968: p. 97) quotes a summary provided to him by Leo Daniël Brongersma (1907–1994), back then director of the museum in Leiden (The Netherlands), based on which it is evident that van Hasselt did not only coin the name, but also provided the Latin description. This makes it a Code-compliant description, based on which I attribute the authorship for the name of the Javan caecilian here to Johan Conrad van Hasselt (1797–1823), regardless whether it originally was intended to be incorporatd into H. Boie's *Erpétologie de Java*. In essence, Taylor (1968: p. 94) therefore technically appears to be the most precise by listing it as "Van Hasselt (in. H. Boie in F. Boie)".

[2] During the early 19th century, such prize tasks invited students to produce a substantial scholarly treatise on a specified scientific problem, with the best submission receiving a monetary or honorary award

Mohring who died on 03 September 1831 at the age of 66 years, nine months and eleven days, meaning he was born on 22 November 1764. We also find a "Doctor medicinae et chirurgiae" Carl August Mohring who died on 10 April 1838 at the age of 38 years, ten months and 22 days. This, in fact, implies a date of birth on 19 May 1799, so it seems highly plausible that these entries indeed correspond to our author and his father.

No other publications by Mohring other than his dissertation could be identified so far and it seems likely that he only practiced as a physician after obtaining his degree, and apparently died at a relatively young age. The records of the Pedagogium Illfeld indeed state that he died as a physician in Nordhausen (Wiedasch 1853), but provide no specific date. In general, this assumption also agrees with the overall tone in which the preface to the dissertation is written, making clear that the general interest of Mohring was in the actual medical field (see below).

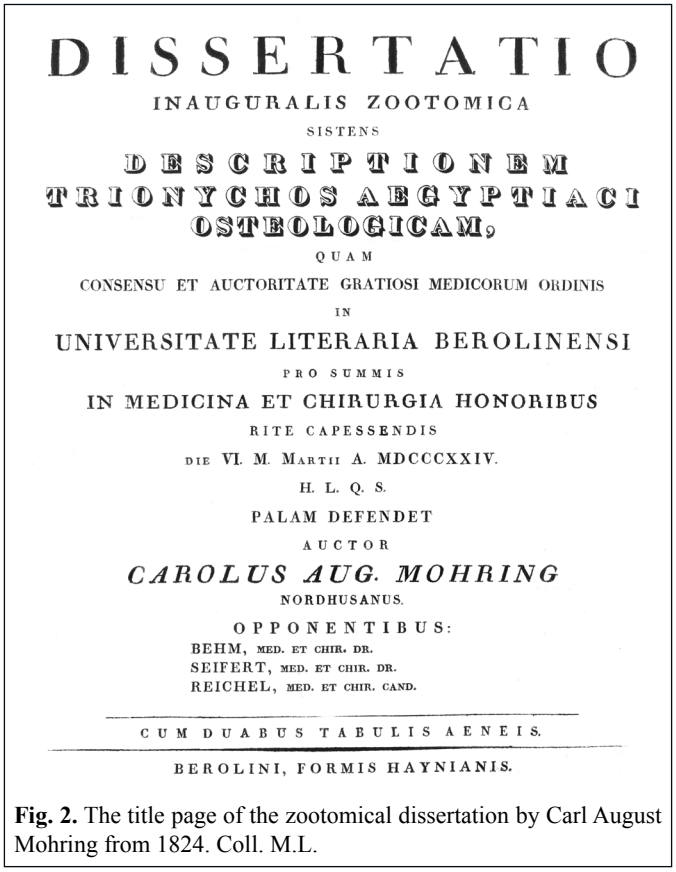
The Dissertation on the Osteology of the Egyptian Turtle by Mohring

The dissertation (Fig. 2) is in a small quarto format (approx. 24.5 x 20.7 cm) and the five signatures covering a total of 36 pp. collate as follows. The title page counts as the first page in the subsequent page numbering and reads in its entirety:

> "Dissertatio inauguralis zootomica sistens descriptionem Trionychos Aegyptiaci osteologicam, quam consensu et auctoritate gratiosi medicorum ordinis in universitate litteraria Berolinensi pro summis in medicina et chirurgia honoribus rite capessendis die VI. M. Martii A. MDCCCXXIV. H. L. Q. S. palam defendet actur Carolus Aug. Mohring Nordhusanus. Opponentibus: Behm, med. et. chir. dr. Seifert, med. et. chir. dr. Reichel, med. et chir. cand. Cum duabus tabulis aeneis. Berolini, formis Haynianis."

> "Inaugural zootomical dissertation presenting the osteological description of the Egyptian *Trionyx*, which, with the consent and authority of the gracious medical faculty of the University of Berlin, will be duly defended publicly for the highest honors in medicine and surgery, on the 6th day of March in the year 1824, at the customary hour and place, by Carl August Mohring of Nordhausen. Opponents: Behm, Doctor of Medicine and Surgery; Seifert, Doctor of Medicine and Surgery; Reichel, Candidate of Medicine and Surgery. With two copper plates. Berlin, at the presses of Hayn."

The printer was Gottfried Hayn (1762–1826). On the verso of the title is a quote from the Roman medical writer Aulus Cornelius Celsus: "Hae res non quidem faciunt medicum sed medicum ornant. Cels" ("These things do not indeed make a physician, but they adorn a physician."). The following



DISSERTATIO
INAUGURALIS ZOOTOMICA
SISTENS
DESCRIPTIONEM
TRIONYCHOS AEGYPTIACI
OSTEOLOGICAM,
QUAM
CONSENSU ET AUCTORITATE GRATIOSI MEDICORUM ORDINIS
IN
UNIVERSITATE LITERARIA BEROLINENSI
PRO SUMMIS
IN MEDICINA ET CHIRURGIA HONORIBUS
RITE CAPESSENDIS
DIE VI. M. MARTII A. MDCCCXXIV.
H. L. Q. S.
PALAM DEFENDET
AUCTOR
CAROLUS AUG. MOHRING
NORDHUSANUS.
OPPONENTIBUS:
BEHM, MED. ET CHIR. DR.
SEIFERT, MED. ET CHIR. DR.
REICHEL, MED. ET CHIR. CAND.
CUM DUABUS TABULIS AENEIS.
BEROLINI, FORMIS HAYNIANIS.

Fig. 2. The title page of the zootomical dissertation by Carl August Mohring from 1824. Coll. M.L.

two unpaginated leaves contain typical elaborate dedications to Rudolphi and Blumenbach, respectively, followed by an unpaginated leaf with the "Prooemium" (see the translation below). The second signature begins with the "Prolegomena"; on the verso of its first leaf is the first page numbering (i.e. 10). The remaining text comprises a "Diagnosis" on p. 11, followed by the osteological descriptions (pp. 12–28) and the plate captions (pp. [29]–34), and ends with the CV along with the theses defended (pp. [35]–36). In addition, there are two folded plates — Tab. I (approx. 21.7 x 26.8 cm) and Tab. II (approx. 24.5 x 41.8 cm) — with copper engravings bearing "Müller del." and "F. Guimpel sc." at the bottom of each set of illustrations.

The name Müller appears to refer to Johannes Müller as being responsible for the drawings (see also below), while the engraver appears to be Friedrich Guimpel, who according to Hitzig (1826), based on an autobiographical note, was born on 01 August 1774 in Berlin, became "Königl. Acad. Künstler" in 1814 and "Königl. Preuss. Professor der Akademie der Künste zu Berlin" in 1817. Ratzeburg (1872) therefore was most likely in error in giving the year 1768 for his birth, but reports his death on 17 January 1839. Ratzeburg (1872) furthermore states that:

> "Kupferstecher mit civilen Preisen waren [...] im ersten Viertel unseres Jahrhunderts immer noch gesuchte Leute, und unter diesen in Berlin besonders Guimpel

sehr begehrt, theils weil viele Dissertationen, meist anatomischen Inhaltes, mit Abbildungen erschienen, die Guimpel für jeden beliebigen Preis den armen Studenten und Doctoranden liefert."

"Engravers with reasonable prices were still sought-after people in the first quarter of our century, and among them in Berlin, Guimpel was especially in demand, partly because many dissertations, mostly of anatomical content, appeared with illustrations, which Guimpel supplied to the poor students and doctoral candidates at any price they could afford."

The *Bayerische Staatsbibliothek* (Munich, Germany, accessed 30 September 2025) provides a digitized copy of the complete text (mirrored in Google Books, accessed 30 September 2025), but lacks usable reproductions of the plates.

The Relationship Between Mohring and Müller

Baur (1889) appears to be the sole author that has noted the connection between Mohring and Müller. When referring to Mohring (1824) he states "in einer unter Joh. Müller verfaßten vorzüglichen Dissertation" ("in an excellent dissertation written under Joh. Müller"), which implies that this dissertation was supervised by Müller. This, however, would have been exceptionally unusual. Müller went to Berlin shortly after obtaining his doctorate, but only completed his habilitation after his return to Bonn. In the German academic system, a habilitation usually still is the formal requirement for presiding over a higher degree. The fact that Müller held no formal position at the university in Berlin during his visit during the early 1820s makes it further extremely unlikely that he acted in any official capacity in this case. The situation is resolved if we look at the preface of the dissertation (translated primarily with https://www.perplexity.ai and then slightly adjusted):

"When, in order to obtain the highest honors in both branches of medicine, it was necessary for me to compose an inaugural dissertation, it often occurred to me to treat some part of therapy; but when I saw that a great multitude of dissertations had already been written on physiological, pathological, or therapeutic subjects, and wished that my little work might not appear altogether useless both to myself and to others, I hesitated so much in choosing such a theme that, abandoning my original plan, I turned instead to a field entirely different — one suited to a beginner and yet worthy of description.
Turning this over in my mind, I passed on to comparative anatomy, that part of medicine which, though popularly called less practical and for that reason often despised by many physicians as useless, must nevertheless rightly be regarded as the foundation of physiology and pathology, and therefore of the entire art of medicine.
The illustrious Rudolphi, most renowned man — Privy Medical Counsellor to the King, professor, etc., etc. — when consulted by me on this matter, with remarkable kindness and goodwill suggested as the subject of my dissertation the description of the skeleton of the Egyptian turtle, recently brought into the Royal Anatomical-Zoological Museum, differing greatly from others in its structure, and he allowed it to be employed for our use. For this singular generosity I render, and will always render, the deepest thanks to this most distinguished man; and I must also pay the well-deserved thanks of friendship to the most erudite Müller, to whose advice I am much indebted in several respects.
In whatever way, therefore, this little work will turn out, if it does not altogether displease learned men, we shall greatly rejoice, and it will encourage us, given the opportunity, to discuss this subject more accurately hereafter.
Farewell, and grant me your favor."

So the dissertation obviously was conducted under the supervision of Rudolphi and not Müller. But Müller nonetheless was thanked for multifacetted advice with respect to this piece of work, although no specifics on the detailed nature of his supportive role are provided. However, Müller's support actually appears to extend into the visible realm via the drawings that served the basis for the two plates appended to the dissertation of Mohring.

The Osteological Illustrations of the Egyptian Turtle by Müller

The name Müller literally is the most generic German surname imaginable, making a simple naming of a "Müller" in a preface or a "Müller del." on a plate without any further context of course nearly completely meaningless. The context with Johannes Müller, however, is more than plausible considering the time and place the dissertation was conducted. Müller visited Berlin just then because of Rudolphi and the opportunities that came with him, one of the primary ones being able to concern himself with all sorts of interesting anatomical issues.

Müller later also unambiguously provided the primary drawings for numerous of his own anatomical publications, so it is well documented that he had very good drawing abilities. Most of them also are just signed with a "Müller del.", such as that in his first description of the lymphatic hearts of chelonians (Müller 1841), while others (e.g. Müller 1832) clearly state "J. Müller, ad nat. del." or even "Joh. Müller del." (e.g. Müller 1844).

In essence, it simply appears to be the most parsimonious explanation to assume that the "Müller" in the preface and

the "Müller del." on the plates indeed refer to Johannes Müller. All the more if we look at what du Bois-Reymond (1860) wrote about Müller's first visit in Berlin:

> "Dann aber ist in den Studien, die er bei Rudolphi auf dem Berliner anatomischen Museum, der zukünftigen Stätte seiner ruhmvollsten Leistungen, unternahm, unmittelbar der Keim vieler seiner späteren Arbeiten zu suchen. Für den Druck vollendet hat er in dieser Zeit nichts. Statt dessen sieht man ihn mit einer Art wissenschaftlichen Heisshungers, mit einer Begier als solle er keinem dieser sein ganzes Wesen entzündenden Gegenstände je mehr nahen, sich mit der Anschauung der ihm dargebotenen Schätze aus allen Naturreichen sättigen, und mit gewissenhaftester Treue jeden Augenblick ausnutzen, um nach allen Richtungen seine Kenntnisse zu erweitern und zu vertiefen. Vieles Anatomische wurde nach eigenen Präparaten gezeichnet, Einzelnes sogar, nach der dilettirenden Sitte der Zeit, die wohl durch die Seltenheit geschickter Künstler geboten war, von ihm selber in Kupfer radirt."

> "At that time, however, in the studies he undertook with Rudolphi in the Berlin anatomical museum —the future site of his most illustrious achievements — the immediate germ of many of his later works may be found. During this period, he completed nothing for publication. Instead, one observes him, possessed by a kind of scientific hunger, with an eagerness as though he was never again to approach any of the objects that fired his whole being, nourishing himself with the contemplation of the treasures offered to him from every kingdom of nature, and with the most scrupulous fidelity utilizing every moment to broaden and deepen his knowledge in every direction. Many anatomical subjects were drawn from his own preparations, and some, following the amateur custom of the age — perhaps prompted by the rarity of skilled artists — even etched in copper by his own hand."

The first plate of Mohring (1824) depicts the skull of the Egyptian turtle (Fig. 3). In a series of eight figures, Müller captures the skull in a variety of views. The second plate (Fig. 4) covers, in two figures, a complete ventral view of a skeletonized specimen as well as a detail of the removed plastron.

Notes on the Specimen Used by Müller

The species referred to as the Egyption turtle is *Trionyx triunguis* (Forskål, 1775). Mohring (1824) states in his preface that the specimen serving the basis for this dissertation was "recently brought into the . . . museum". However, he provides no further details and we can only assume that it must have arrived in Berlin some time prior to 06 March 1824, when the dissertation was defended. At that time, Friedrich Wilhelm Hemprich (1796–1825) and Christian Gottfried Ehrenberg (1795–1876) were travelling through Egypt and Arabia and collected for the museum in Berlin. Stresemann (1954) provides intriguing details of potential relevance by his archival work: in a letter that reached Berlin on 14 September 1822, Hemprich wrote to Hinrich Lichtenstein (1780–1857) that by 10 May 1822 they had collected a small *Trionyx*, and on 18 May 1822 caught two more unspecified specimens. Their sixth shipment of specimens left Alexandria (Egypt) already in September 1821 and the seventh did so on 01 October 1822, making the latter the most suitable candidate for having contained the aforementioned at least three specimens of *Trionyx*. This shipment comprising of 29 crates reached Berlin on 19 March 1823 and included 242 specimens of amphibians and reptiles, of which 212 were preserved in spirit (Stresemann 1954). This was about a year before Mohring defended his thesis, and theoretically would have sufficed to perform the anatomical work. However, the *Museum für Naturkunde* in Berlin currently houses three specimens that derive from the Hemprich and Ehrenberg expedition, namely ZMB 27, 28, 30. All three are stuffed preparations and one (ZMB 28) is actually a juvenile, therefore perfectly matching the records provided by Hemprich from the field. It must be noted though that this could very well be just a coincidence and that the two travellers in fact may have sent more than these three specimens. The old catalogue that introduced this numbering (dating to the mid 1850s) lists another specimen of "*Trionyx aegyptiacus*" (ZMB 29), which was collected by a "Bernard", but this appears to be lost today and it is unclear when it entered the collection.

The timeframe of the Hemprich and Ehrenberg expedition and the fact that both were in a good relationship with Rudolphi, as evidenced by the letters directed to him from the field (see also Stresemann 1954), makes it at least plausible that the Egyptian turtle Rudolphi had received for his museum also derived from this source. All the more because Lichtenstein had already begun selling off duplicates while the two were still actively collecting (Lichtenstein 1823). The arrival of the seventh shipment by Hemprich and Ehrenberg even had delayed Lichtenstein's ambition to publish his catalogue (compare also Bauer 2003), but no "*Trionyx aegyptiacus*" are offered therein. This, however, does not preclude that Rudolphi may have been able to get hold of such a specimen.

When the anatomical-zootomical museum that Rudolphi had built and that Johannes Müller subsequently enlarged was shut down, relevant specimens were transferred to the zoological museum. Unfortunately there are no potentially matching skeletal specimens preserved in the collection of today's *Museum für Naturkunde*. In essence, the origin and fate of the specimen that served for the dissertation of Mohring remains unresolved, with a potential Hemprich and Ehrenberg association as the currently best guess.

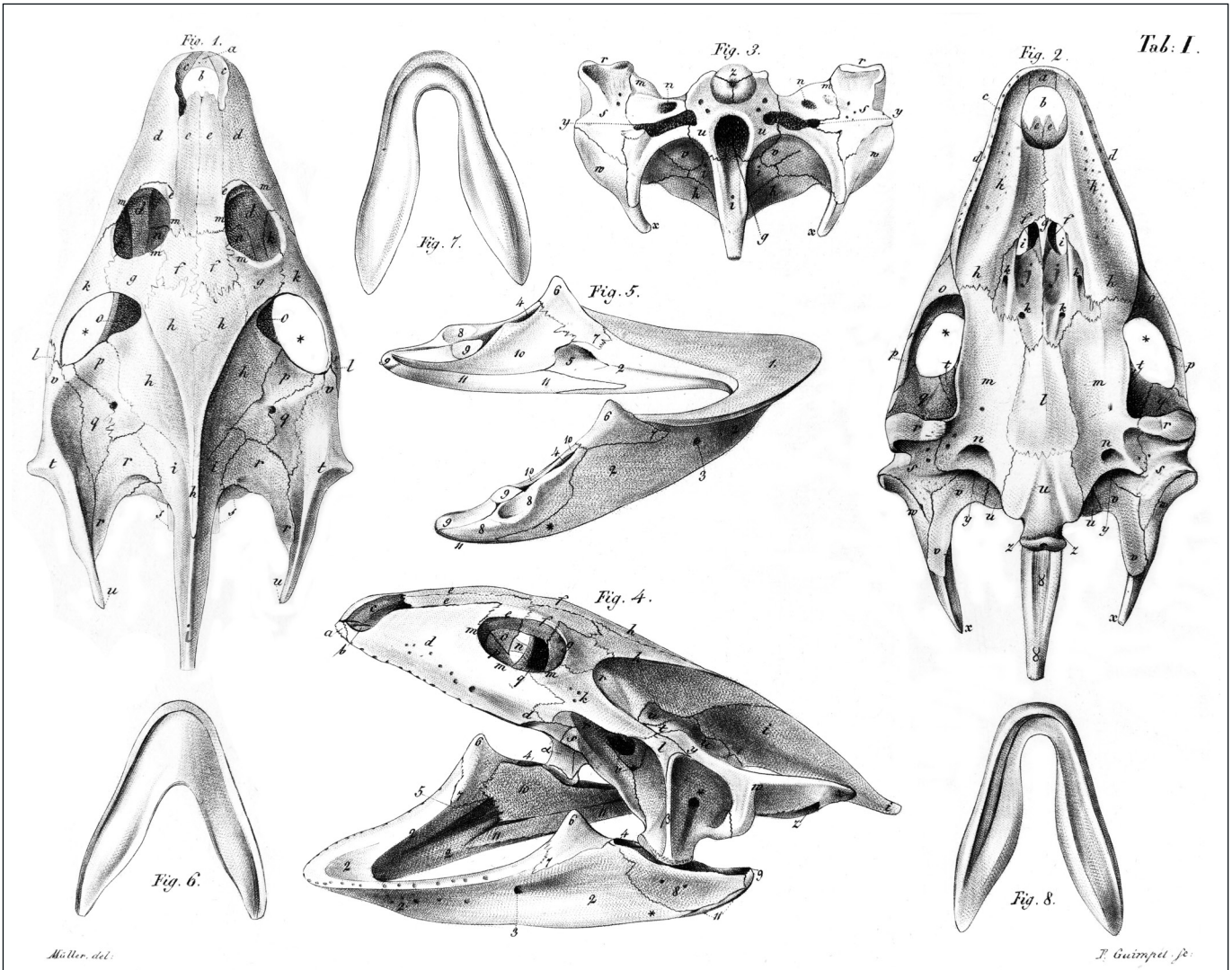


Fig. 3. The first plate of Mohring (1824), depicting the skull of *Trionyx triunguis* in various views. Coll. M.L.

Brief Notes on the Publication History of the Anatomy of Softshell Turtles

Mohring's (1824) dissertation appeared during a time at which the knowledge about chelonian anatomy in general still was somewhat in its infancy. Although some of the earliest illustrated comparative anatomical works included certain sections on various species of chelonians (e.g. Coiter 1575, Perrault 1676, Blasius 1673, 1674, 1676, Caldesi 1687, Gottwaldt 1781) it was, in essence, the recently published work of Bojanus (1819–1821) that eventually set the gold standard (see also Lambertz 2023). However, Bojanus' monograph covered only the European pond turtle, *Emys orbicularis* (Linnaeus, 1758).

Trionyx triunguis actually was the second species of softshell turtle ever described, predated only by *Amyda cartilaginea* (Boddaert, 1770) (TTWG 2025). Starting with Boddaert (1770), the major illustrated works on chelonians already depicted complete softshell turtles (e.g. Schneider 1783, Schoepf 1792–1801), but no anatomical details were illustrated. Geoffroy-St.-Hilaire (1809a) eventually erected the genus *Trionyx* and subsequently also provided the first illustrations of *T. triunguis* (Geoffroy-St.-Hilaire 1809b). Two of his plates were devoted to this species, of which the first displays a ventral and a lateral intact view. These illustrations were based on drawings by Henri-Joseph Redouté (1766–1852), made during the French campaign in Egypt. Enhanced by a scenic landscape framing for the lateral view, they were also reproduced as mirror images for Geoffroy-St.-Hilaire's (1809c, 1829) reptile section of the iconic *Description de l'Égypte* (Fig. 5). The original technical paper furthermore contains a second plate covering the osteological details of the carapace and plastron (Fig. 6).

Mohring's (1824) dissertation was only the second publication containing anatomical details of a trionychid, and enhanced the level of information considerably. Not only were there details on the shell, but also the remaining axial as well as appendicular skeleton was illustrated for the first

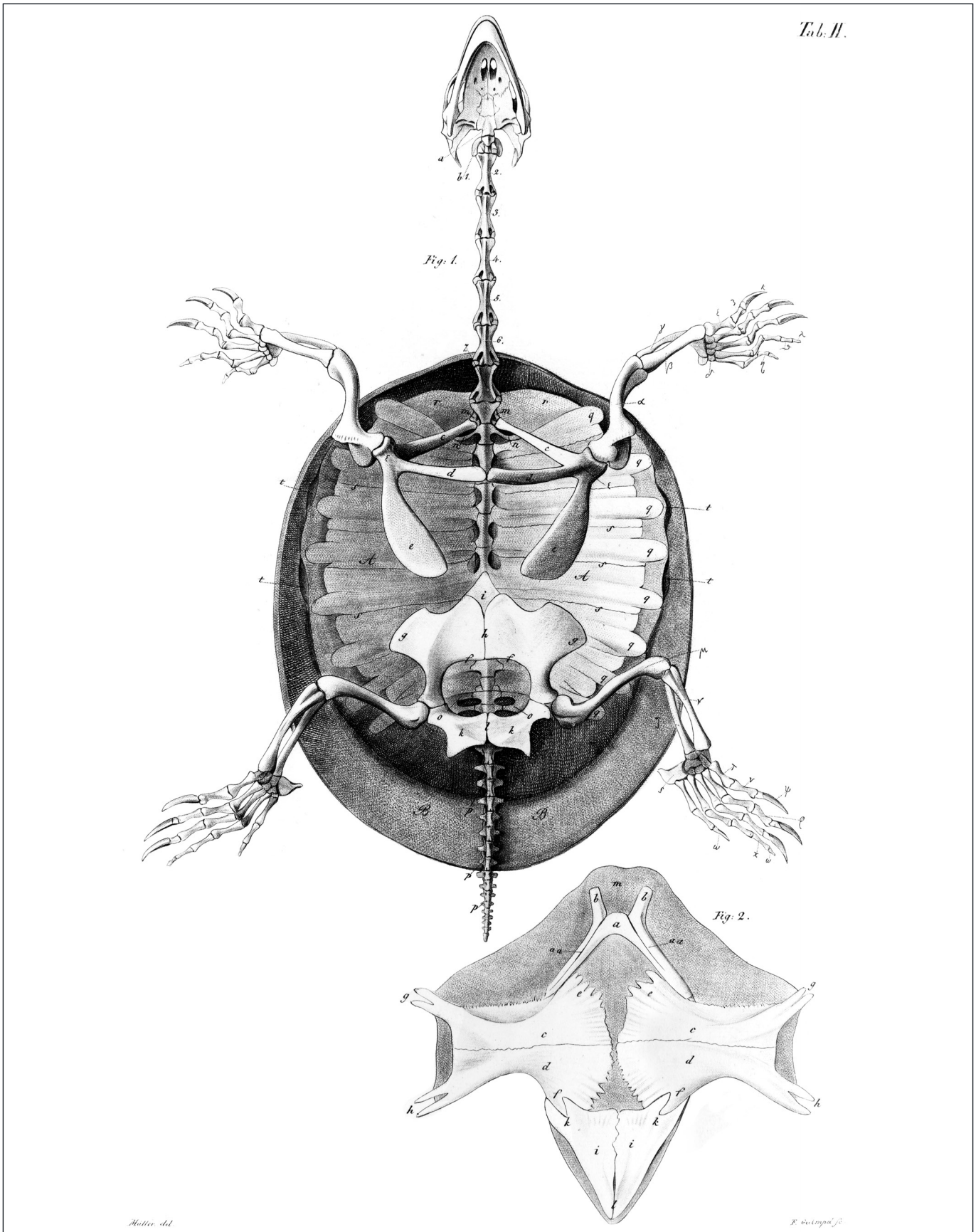


Fig. 4. The second plate of Mohring (1824), depicting the articulated skeleton of *Trionyx triunguis* with a separated plastron. Coll. M.L.

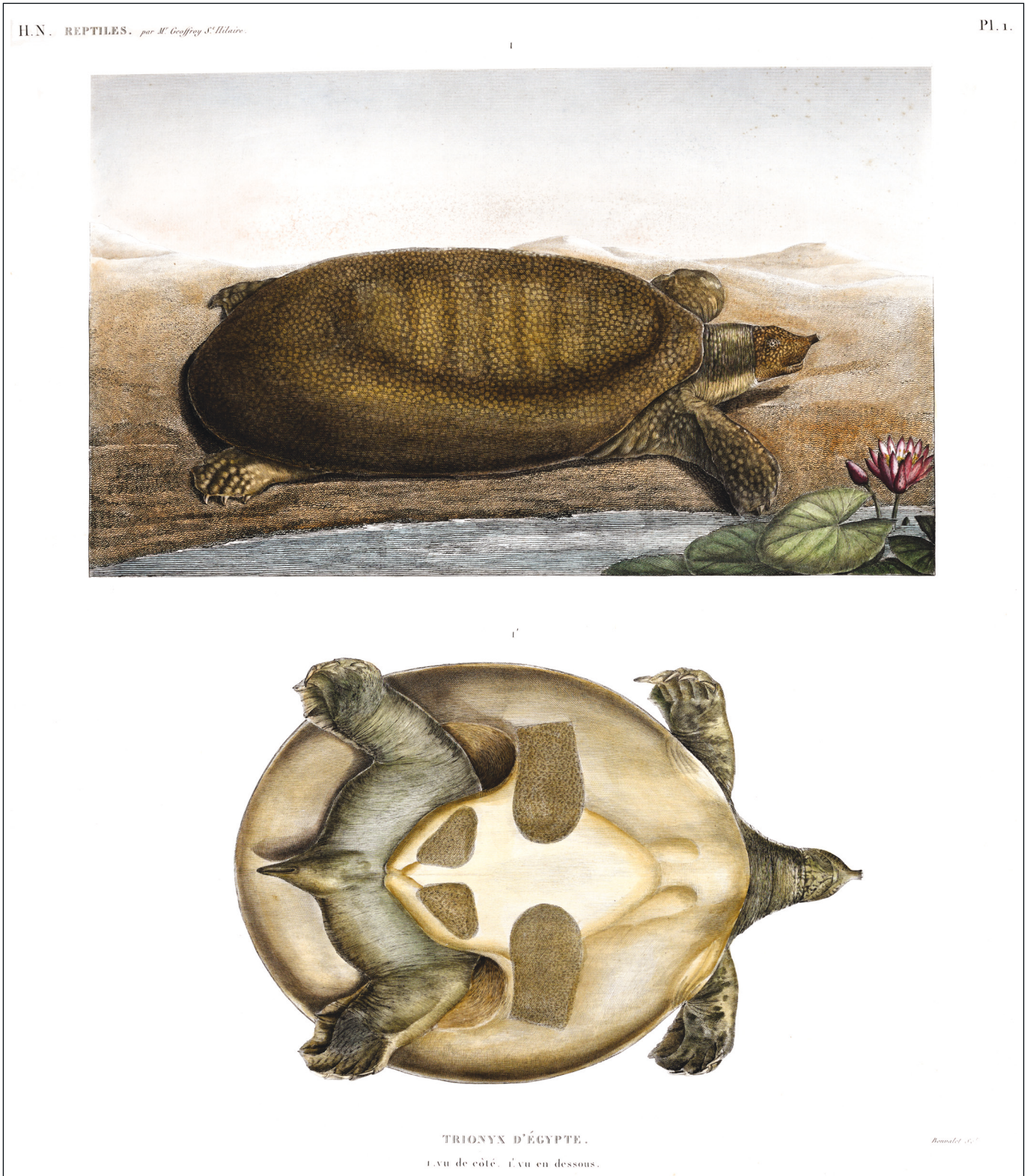


Fig. 5. Reptiles Pl. 1 of the *Description de l'Égypte* (Panckoucke edition), depicting life *Trionyx triunguis*, with a later hand-coloring. Coll. M.L.

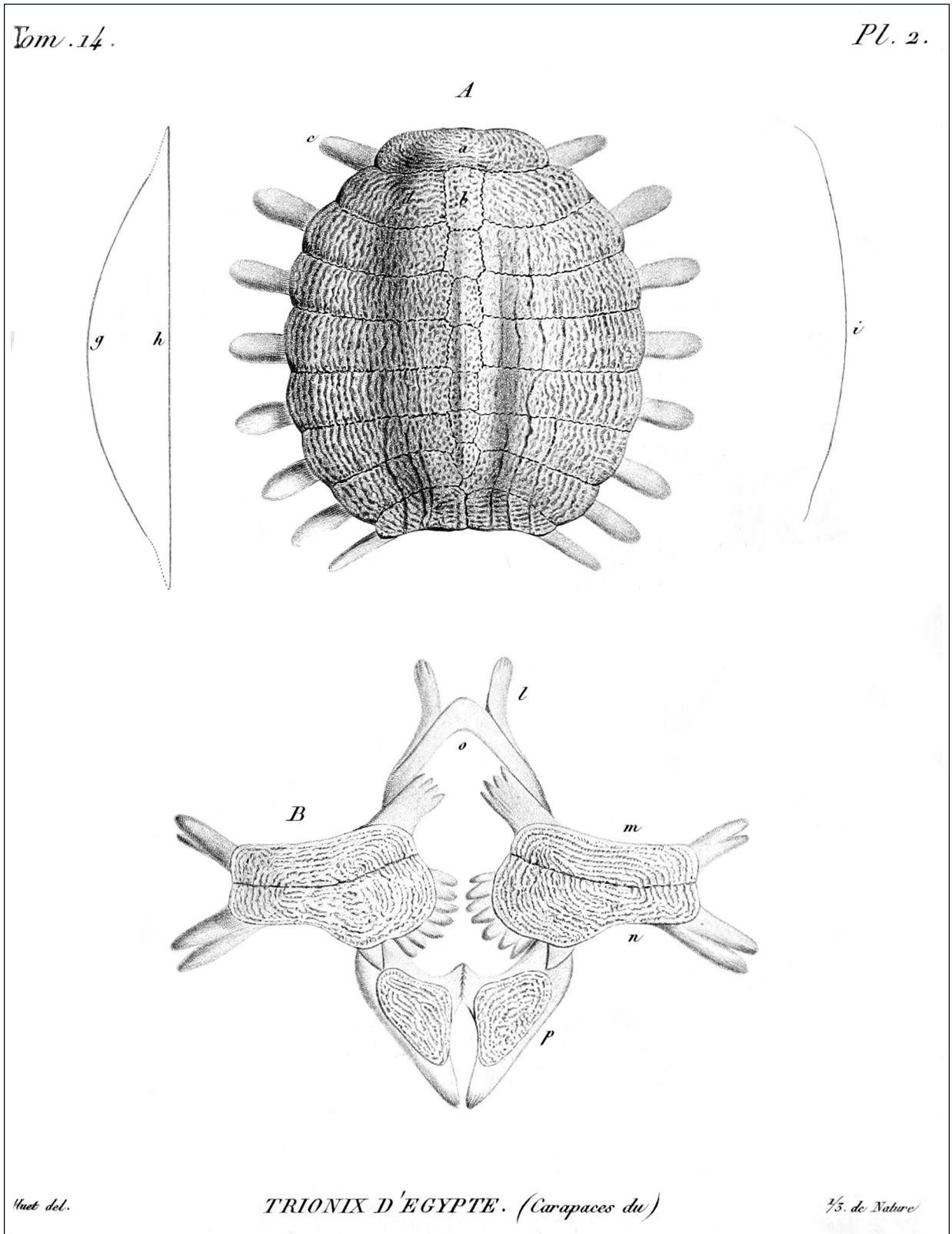


Fig. 6. The second plate accompanying the review of the softshell turtles by Geoffroy-St.-Hilaire (1809b), depicting the carapace and plastron of *Trionyx triunguis*. From Biodiversity Heritage Library.

time. Furthermore, the skull, in particular, was depicted in great detail for the first time, and discussions of the cranial bones were of exceptionally great interest during that time (e.g. Oken 1807, Spix 1815, Bojanus 1819, Carus 1828).

Mohring's (1824) contribution was indeed noticed. Carus (1834) and Stannius (1856), for instance, mentioned it in their textbooks, and also Hoffmann (1890) referred to it in his comprehensive review. Peters (1838) also cited it in his own dissertation (which actually was supervised by Müller), but curiously did not so in his more widely disseminated German translations that were published subsequently (Peters 1839a,b).

While isolated contributions to trionychid anatomy surfaced in between (e.g. Stoffert 1889), the gold standard for anatomical detail within this clade of chelonians eventually was set by a series of publications on *Pelodiscus sinensis* (Wiegmann, 1834) by Ogushi (1911a,b,c, 1913a,b,c, 1914), a Japanese anatomist working at that time in Zurich (Switzerland). Just as Bojanus remains so far unchallenged for his degree of detail on a single emydid species, Ogushi holds this honor for trionychids to the present day. Both of them, however, did something that at best could be compared to the work of Thomson (1932) on a testudinid, but surpasses any other study on chelonian anatomy. Curiously, the dissertation of Mohring (1824) was neither cited by Stoffert (1889) nor Ogushi.

Final Remarks

Johannes Müller contributed considerably to the field of comparative anatomy, particularly during his mid-career (see in addition to the biographical works cited above e.g. Cole 1944, Nyhart 1995, Mocek 1998). The drawings serving the basis for the two plates in Mohring (1824) actually are his earliest published marks in that field. As summarized, Müller had at that time published only four works, none of which was of actual anatomical nature. His earliest works (Müller 1822a,b) are somewhat grounded in a "functional morphological realm", but are extremely influenced by natural philosphy. As a matter of fact, Müller later in life despised his juvenilia so much that he went so far and bought back every copy he could get his hands on and burnt them (du Bois-Reymond 1860).

Most frequently Johannes Müller is thought of as the great physiologist he undoubtedly was (e.g. Ebecke 1944, Ebecke, 1951, Lohff 1993). His hometown Koblenz accordingly erected a statue of him holding his *Handbuch der Physiologie* in 1899. Likewise, nobody would challenge his significance to the field of comparative anatomy, but he definitely may not be thought of by too many herpetologists. But as this article demonstrates, his earliest contribution to comparative anatomy proper, was a valuable contribution to the osteology of a softshell turtle.

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